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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR  | ATTORNEY DOCKET NO.         | CONFIRMATION NO.       |
|---|-------------|-----------------------|-----------------------------|------------------------|
| 10/688,864  | 10/17/2003  | Emanuel Michael Sachs | 3253/118                    | 9442                   |
| 2101 7590 01/10/2008<br>BROMBERG & SUNSTEIN LLP<br>125 SUMMER STREET<br>BOSTON, MA 02110-1618 |             |                       | EXAMINER<br>SONG, MATTHEW J |                        |
|   |             |                       | ART UNIT<br>1792            | PAPER NUMBER           |
|   |             |                       | MAIL DATE<br>01/10/2008     | DELIVERY MODE<br>PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

**Application No.**

10/688,864

**Applicant(s)**

SACHS, EMANUEL MICHAEL

**Examiner**

Matthew J. Song

**Art Unit**

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 November 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-63 and 65-74 is/are pending in the application.
- 4a) Of the above claim(s) 1-10, 23-58 and 60-63 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 11-22, 59 and 65-74 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/ are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 11-22, 59 and 68-74 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 11 recites "a pair of sidewall extending downward from opposing edges of the top surface, the edges formed to retain substantially all of the melt by capillary attachment to the top surface of the crucible" in the last 3 lines. There is no support for this limitation. First, there is no support that the "edges retain substantially all of the melt by capillary attachment." Second, there is no support because the applicant alleges support based on figure 6a and 6b, note page 16 of the remarks, however Figure 6 does not have the top surface supporting substantially all of the melt and a pair of sidewall extending downward, which is supported by Figure 8. Figure 6 does not show a top surface with a pair of sidewalls extending downward, the sidewalls extend upward. The same arguments apply for claims 12-22, 59, and 68-74, which claim the same limitation.

3. Claims 11-22, 59 and 68-74 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 11 recites "a pair of sidewall extending downward from opposing edges of the top surface, the edges formed to retain substantially all of the melt by capillary attachment to the top surface of the crucible" in the last 3 lines. The claim is not enabled for a top surface supporting substantially all of the melt and sidewalls protruding downwardly that retain substantially all of the melt because the sidewalls extend downward from the top surface. A comparison of applicant's Figures 6a and 8 clearly shows that the downwardly protruding sidewalls cannot retain all of the melt support by the top surface. The walls must extend upwardly to support the melt and retain the melt as claimed and illustrated in Figure 6a.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 11-22, 59 and 68-74 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 11 recites "a pair of sidewall extending downward from opposing edges of the top surface, the edges formed to retain substantially all of the melt by capillary attachment to the top surface of the crucible" in the last 3 lines. It is unclear how the walls extend downward with the top surface supporting all of the melt while having the

downwardly protruding sidewalls retain substantially all of the melt by capillary attachment (See Applicant's figure 8). It appears that the sidewalls would need to extend upwardly to make the claim make sense, See applicant's Figure 6a. Also, it is unclear what "retaining substantially all of the melt" is intended to cover. There appears to be a large of amount of melt that is not retained by capillary attachment, note the figure on page 16 of the remarks, that is retain using the counteractive mechanical forces like Sachs.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 11-16, 18, 19, 21, 22 and 68-74 are rejected under 35 U.S.C. 102(b) as being anticipated by Sachs (US 4,627,887).

Referring to claims 11, 70 and 73, Sachs discloses an apparatus for forming crystalline ribbon comprising a crucible (Abstract). Sachs also discloses a pair of sidewalls extending downward from the edges of the top surface of the crucible (Figs 17-19). Sachs discloses the crucible has a flat top surface which supports a melt, where the only protrusions are the sidewalls that extend downwardly (Fig 17), this reads on applicant's substantially flat top surface supporting substantially of a melt. Sachs also discloses capillary retention of the melt (col 15, ln 10 to col 16, ln 55), thus would be capable of applicant's claimed intended use limitation

requiring the edges retaining the melt by a capillary attachment to the top surface of the crucible.

A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Here Sachs discloses a flat top surface and sidewalls which extend downward from the opposing edges of the top surface, thus would be capable of retaining substantially all of the melt depending on the quantity of melt used. Structurally the apparatus merely requires a top surface and downwardly protruding sidewalls. There are no additional structural features that distinguish the sidewalls of Sachs and the claimed sidewalls.

Referring to claims 12 and 72, Sachs discloses using a pair of strings **34** and string apertures (col 8, ln 40-67 and Fig 11).

Referring to claim 13-14, the claimed limitation, "the crucible adapts" is an intended use limitation. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. The crucible taught by Sachs has all of the claimed structural features, thus would be capable of the claimed intended use.

Referring to claim 15, the pulling of a ribbon is an intended use limitation. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the

claim. The crucible taught by Sachs has all of the claimed structural features, thus would be capable of the claimed intended use.

Referring to claim 16, Sachs discloses a substantial portion of the melt above the edges of the hole in the middle crucible (Fig 17).

Referring to claim 18, Sachs discloses graphite (col 10, ln 60-65).

Referring to claim 19, Sachs discloses the edges define a recessed top surface (Fig 17-19).

Referring to claim 21, Sachs discloses a means for replenishing (col 10, ln 45-65).

Referring to claim 22, Sachs discloses a heater, heater rods and a thermocouple for controlling temperature (col 14, ln 5-65 and col 3, ln 55 to col 4, ln 10).

Referring to claims 68-69, Sachs discloses a crucible having a substantially flat top surface, a pair of sidewalls extending downward from opposing edges of the top surface and a means for pulling **160** a crystal ribbon (col 11, ln 25-65). In regards to the “at least a portion of the boundary profile is concave downward limitation” and “the forming an inflection point in at least a portion of the a cross sectional boundary profile of the melt”, these limitation is merely an intended use limitation. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. The crucible taught by Sachs has all of the claimed structural features, thus would be capable of the claimed intended use. Boundary profile is a function of thermal conditions and can be created into a desired shape by desired heating, note column 8, lines 20-40.

Referring to claim 70, Sachs discloses a melt above the edges of the crucible (Fig 17).

8. Claims 65-67 are rejected under 35 U.S.C. 102(b) as being anticipated by Nagai et al (US 5,902,395).

Nagai et al discloses an apparatus for replenishing a crucible comprising feeding apparatus (Abstract). The feeding apparatus comprising a feed pipe 10 and the feed pipe has a mechanism for upward sliding movement (col 12, ln 60-67, col 10, ln 1-50 and Fig 7I), this reads on applicant's movable feeder in a first and second direction along the crucible because the feeder is raised or lowered on an angle according to Fig 7I. Nagai et al also discloses a vibration feeder (col 3, ln 25-40 and col 9, ln 15-65), this reads on applicant's vibration means for vibrating the feeder. It is noted that claim 65 recites a "means for vibrating the feeder", however no explicit means are disclosed in the specification.

Referring to claim 66, Nagai et al discloses feed pipe.

Referring to claim 67, Nagai et al discloses the feed pipe can be positioned to a distance of 0 mm from the crucible (col 12, ln 15-30), which inherently is less than diameter of the crucible.

### ***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.



10. Claim 17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sachs (US 4,627,887) as applied to claims 11-16, 18, 19, 21, 22 and 68-73 above,

Sachs discloses all of the limitations of claim 17, as discussed previously, except more than one pair of apertures. Sachs discloses a single pair of holes for a pair of strings. The mere duplication of parts has no patentable significance unless a new and unexpected result is produced (MPEP 2144.04). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Sachs by adding one or more additional pair of apertures and strings to produce more crystalline ribbon, thereby improving productivity.

Referring to claim 20, Sachs does not disclose the width of the crucible is between 15 and 30 mm. Changes in size are held to be prima facie obvious (MPEP 2144.04). Therefore, It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Sachs to have a desired size of 15-30 mm to produce a ribbon of desired size.

11. Claim 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sachs (US 4,627,887) as applied to claims 11-16, 18, 19, 21, 22 and 68-73 above, and further in view of Little (US 4,402,786).

Sachs teaches all of the limitations of claim 59, as discussed previously, except an insulator and a moving means for moving the insulator.

In a method of forming crystal ribbons, note entire reference, Little teaches modifying the temperature distribution along the solid/liquid boundary during growth. (col 2, ln 1-45). Little

teaches using a heat shield assembly which can be moved relative to each other to ensure the growing body will have a constant cross-section by controlling the temperature distribution. (col 2, ln 1-45).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Sachs by using the movable heat shield taught by Little to ensure the growing body will have a constant cross-section by controlling the temperature distribution.

### ***Response to Arguments***

12. Applicant's arguments with respect to claims 11-22, 59 and 68-74 have been considered but are moot in view of the new ground(s) of rejection.

13. Applicant's arguments filed 11/7/2007 have been fully considered but they are not persuasive.

Applicant's argument that the Sachs does not teach the sidewalls retain substantially all of the melt is noted but not found persuasive. As discussed previously, this limitation is merely an intended use of the sidewall. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Here, there is no structural difference in the Sachs apparatus and the instantly claimed invention. Structurally, claim 11 merely requires a top surface and a sidewall. There is no structural difference in the sidewall of Sachs and the sidewall claim by applicant. The only alleged difference occurs in the operation of

the apparatus during which capillary attachment would take place, however that is merely an intended use.

Applicant's argument that the opposing edges is not taught by Sachs is noted but not found persuasive. Sachs teaches a left edge and a right edge (Fig 17), thus teaches opposing edges which retain the melt using capillary attachment.

Applicant's argument that Nagai does not teach a feeder is movable along two direction of the crucible is noted but not found persuasive. First, applicant alleges that "along" is different from the vertical movement taught by Nagai. There is no support for the interpretation alleged by applicant. The broadest reasonable interpretation of "along" would encompass vertical movement relative to the crucible walls. "Along" does not hold any special meaning nor has "along" been defined in the specification to mean something else beyond the normal definition of "in the direction of." Second, the feeder merely needs to be "movable" along two directions, i.e. capable of being moved and no mechanism for moving is required. Capable of being moved is extremely broad and almost everything is capable of being moved. Nagai teaches the feed pipe is freely suspending (col 12, ln 60-67), thus would be capable of being moved in two directions. Also, Nagai teaches a feed pipe that moves horizontally and vertically in Figure 2.

### ***Conclusion***

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Harvey et al (US 5,102,494) teaches the same capillary retention in Figure 3 as applicant's Figure 6a, which is the primary basis of the remarks filed 11/7/2007, however Harvey does not teach downwardly protruding sidewalls from the top surface.

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Song whose telephone number is 571-272-1468. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on 571-272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Matthew J Song  
Examiner  
Art Unit 1792

MJS  
January 2, 2008

*/Robert Kunemund/*  
*Robert Kunemund*  
*Primary Examiner*  
*TC 1700*